RESEARCH IMPLEMENTATION REPORT

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Report Date	Report No.	Report Title		
July 2005	SSRP 05/02	Field Investigation Report for Abutment Backfill Characterization		
Principal Investigator			Research Institution	
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Abstract

Caltrans design practice makes use of a load-deformation curve established from the full-scale testing of a 5.5-foot high abutment at the University of California, Davis. The abutment in this test was back filled using a silty clay loam. The current Seismic Design Criteria (SDC) is based on an interpretation of these test results and disregard soil backfill conditions. A more rational approach to bridge design should take the soil backfill material into account through specific abutment load-deformation relationships.

The objective of this project is to characterize typical abutment backfill material used by Caltrans in order to (i) properly design large and full-scale abutment system experiments to be carried out by UCSD; and (ii) develop representative soil properties for use as input parameters for numerical modeling of abutment systems. This report presents the results from a review of abutments from over one hundred (100) bridges on the State Highway System in California

As part of Phase I of the project, a representative selection of bridge plans, including the as-built Log-of-Test-Borings (LOTB) sheets for approximately 115 bridge sites were assembled. Based on the soil information contained in the as-built Log-of-Test-Borings (LOTB) sheets, these bridge sites were categorized into several groups that have similar soil types. In collaboration with UCSD and Caltrans, ten bridge sites from the group will be selected to perform field investigation and lab testing.

In the second phase of this project, the field and laboratory investigation at each site was performed. Two soil borings and two Cone Penetrometer Tests (CPT), as well as pressuremeter testing (PMT), each to a depth of up to 20 feet, were carried out at each selected site. For fine-grained soils, push samples were collected using Shelby tubes. For coarse-grained soils, percussion samples were collected using a SPT or California sampler. Depending on the available traffic window, up to two CPT soundings were performed at each bridge site. At each sounding, shear-wave velocity measurements were collected at 5-foot intervals.

Achievement

Conclusion & Recommendation

The report concluded the number of bridges and soil samples tested under this project were small compared to the variability of site conditions, structures and geographic locations. However, results indicate that soil backfill material varied tremendously across the State, ranging from lean clay to sandy gravel. To establish firm trends for abutment backfill properties on a statewide basis, more fieldwork is needed at bridge sites through out the State, particularly in the northern and in-land areas.

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Implementation Recommendations

UCSD should consider the use of typical soil types from this study as backfill material for the abutment tests to determine abutment load-deformation curves.

Implementation Measures Taken

Under RTA #59A0337, UCSD considered integrating these findings in their tests, but ultimately the Technical Support Team selected alternate soil types to develop the backbone curves based on fundamental soil properties. These soil types were considered, but were not tested directly. Instead, tests were planned with potential future backfill recommendations in mind.